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Stabilization of Solid Oxide Fuel Cells with Yttrium Based Zirconium Oxide WILLIAM COCKERELL, CHRIS CICCARINO, PATRICK WADIE-IBRAHIM, M. ALPER SAHINER, Seton Hall University, ADVANCED MATERIALS SYNTHESIS AND X-RAY CHARACTERIZATION COLLABORATION — Solid Oxide fuel cells (SOFC's) is a device that is used to convert chemical energy from a fuel, such as hydrogen or methane, into electricity through electrochemical reactions. These fuel cells are able to deliver highly efficient electrical conversions. Further advantages of SOFC's include; the high amount of heat enthalpy that is given off by the fuel cell operating at temperatures of 800 to 1,000 degrees Celsius, the modular nature of SOFC's which offers the ability to build larger systems with subsystems of SOFC's in planning of power generation capacity, and the carbon dioxide emission is considerably reduced. It can be seen why these devices are focus of research. In our lab at Seton Hall University, we are attempting to stabilize solid oxide fuel cells with Zirconium (IV) oxide and Yttrium nanoparticles by deposition of $(Y)ZrO_2$ onto the anode of our cell as our electrolyte. One technique of chemical deposition of $(Y)ZrO_2$ onto our anode is by using Pulsed Laser Deposition (PLD). The structural and electrical characterization of the thin films will be presented and electrical performance will be correlated by the deposition conditions. The major purpose of this project is to successfully and efficiently deposit Zirconium oxide and Yttrium nanoparticles to the anode of our SOFC in able to slow degradation of the SOFC's through stabilization, making their use more profitable.

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